



Sustainability: What's all the hype?

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Sustainability: What's all the hype?

- In last half century world has lost $\frac{1}{4}$ of its topsoil and $\frac{1}{3}$ of its forest cover.
- Coral reefs, home to 25% of marine life, has seen dramatic decline in recent decades
- Losing freshwater ecosystems at 6% each year
- In the last 30+ years, we've consumed $\frac{1}{3}$ of the earth's resources



Sustainability: What's all the hype?

Are we just trying to save the planet?



Sustainability: What's all the hype?

Are we just trying to save the planet?

Maybe.



Sustainability: What's all the hype?

Sustainability?

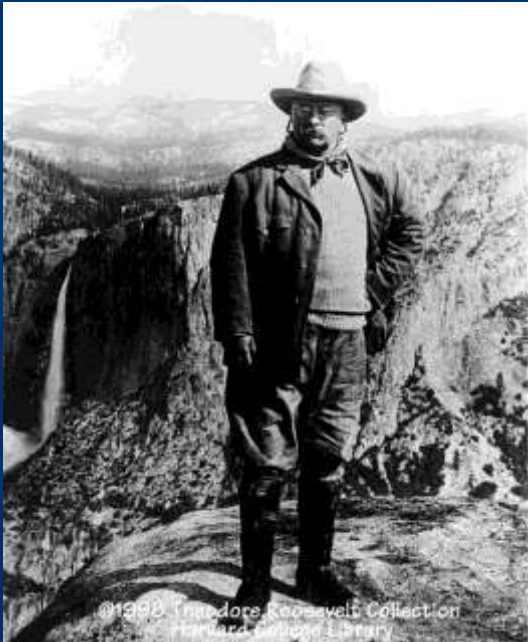


Major People and Events in Environmental History



Major People and Events in Environmental History

Theodore Roosevelt – 1858 - 1919



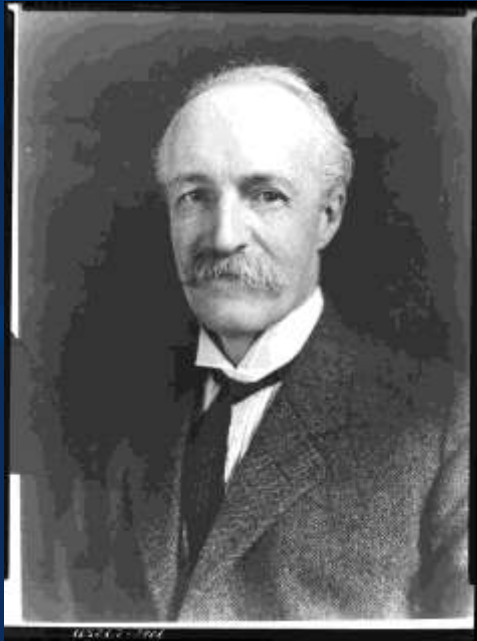
First President to make conservation a national issue

Created the National Forest Service
(150 National Forests, 5 National Parks,
and 18 National Monuments)

“Our duty to the whole, including the unborn generations, bids us restrain an unprincipled present-day minority from wasting the heritage of these unborn generations. The movement for the conservation of wild life and the larger movement for the conservation of all our natural resources are essentially democratic in spirit, purpose, and method.”

Major People and Events in Environmental History

Gifford Pinchot – 1865 - 1946



Utilitarianism – Greatest good for the greatest number of people for the longest period of time

First Forest Chief of the National Forest Service



Major People and Events in Environmental History

John Muir – 1838 - 1914



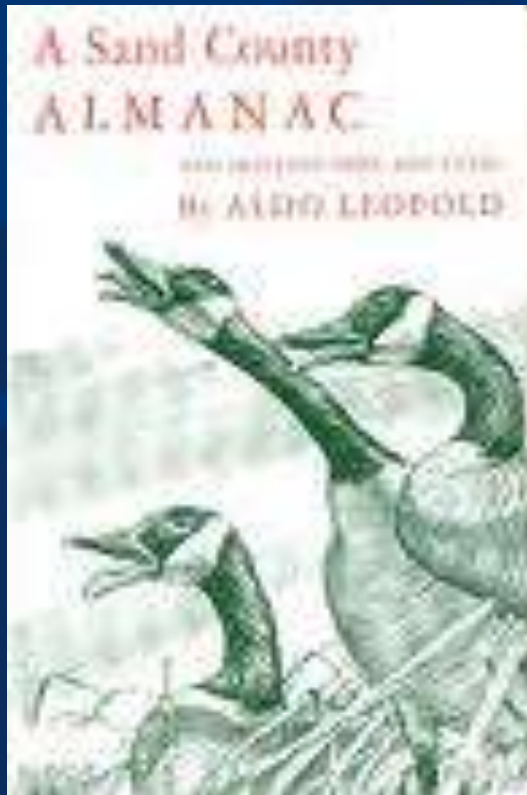
Yosemite National Park

Founder of the Sierra Club

"When one tugs at a single thing in nature,
he finds it attached to the rest of the world."

Major People and Events in Environmental History

A Sand County Almanac – Aldo Leopold (1958)



The Land Ethic: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

Major People and Events in Environmental History

Silent Spring – Rachel Carson (1962)



Pesticide – DDT
Bioaccumulation



Major People and Events in Environmental History

Cuyahoga River – The Burning River (1969)



- 9th fire since 1868 – led to grassroots change
- Great Lakes Water Quality Agreement, Clean Water Act, Environmental Protection Agency, Ohio EPA, and greater oversight for point source pollution

Major People and Events in Environmental History

Spaceship Earth – Apollo 8 Mission (1969)



“Of all the accomplishments of technology, perhaps the most significant one was the picture of Earth over the lunar horizon. If nothing else, it should impress our fellow man with the absolute fact that our environment is bounded, that our resources are limited, and that our life support system is a closed cycle.... The only real recourse is for each of us to realize that the elements we have are not inexhaustible. We’re all in the same spaceship.”

Commander Frank Borman, Apollo 8 Mission

Major People and Events in Environmental History

Chernobyl Disaster (1986)



Only Level 7 (Major Accident) event in history

Birth Defects as far away as Turkey, Germany and Belarus - Down Syndrome peak in Germany (9 months after)

Estimated 4000 deaths from increased cancer risk

Major People and Events in Environmental History

The Brundtland Report (1986)

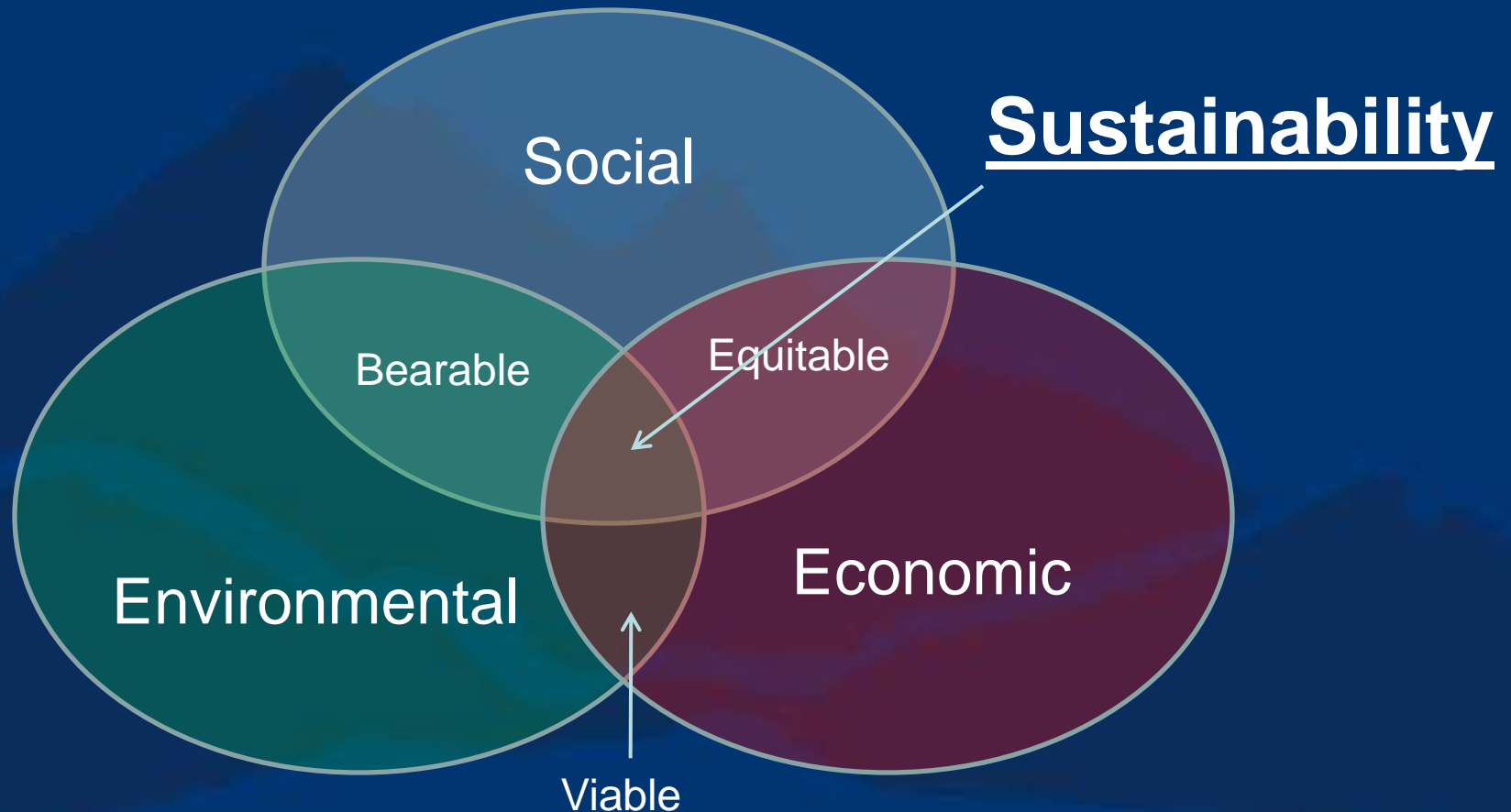


Gro Harlem Brundtland – chair of the World Commission on Environment and Development

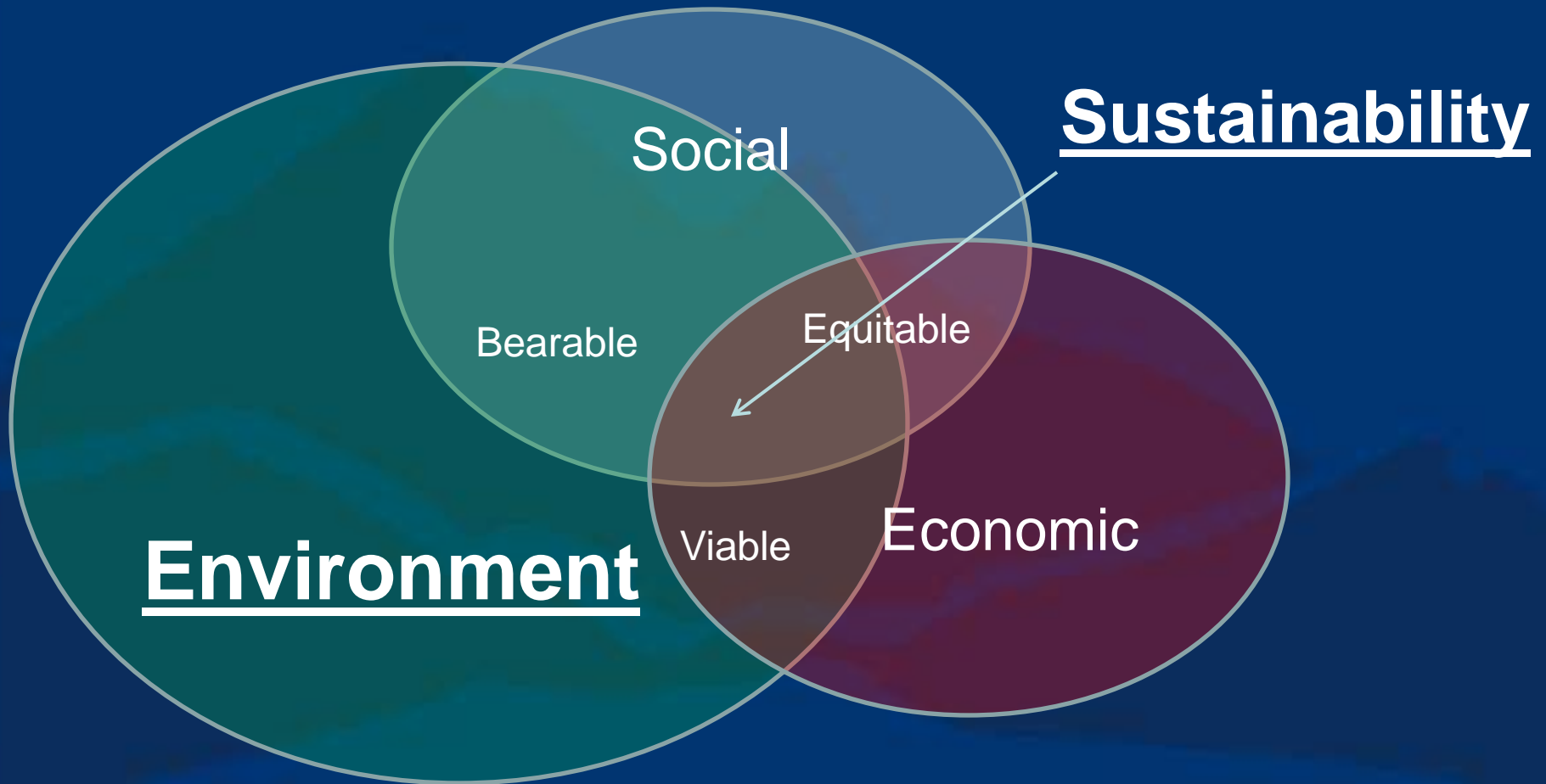
The Brundtland Commission's Key Concepts for Sustainability :

1. Today's needs should not compromise the ability of future generations to meet their needs
2. A direct link exists between the economy and environment
3. The needs of the poor in all nations must be met
4. In order for our environment to be protected, the economic conditions of the world's poor must be improved
5. In all our actions, we must consider the impact upon future generations.

Meeting the needs of the present without compromising the ability of future generations to meet their own needs.



Meeting the needs of the present without compromising the ability of future generations to meet their own needs.





Environment

Our Environment provides vital resources and services upon which ALL life, communities and economies depend.

- Clean Air
- Clean Water
- Food
- Waste Recycling
- Materials and Resources for Shelter, Recreation, communication, transportation, etc., etc.



Environment

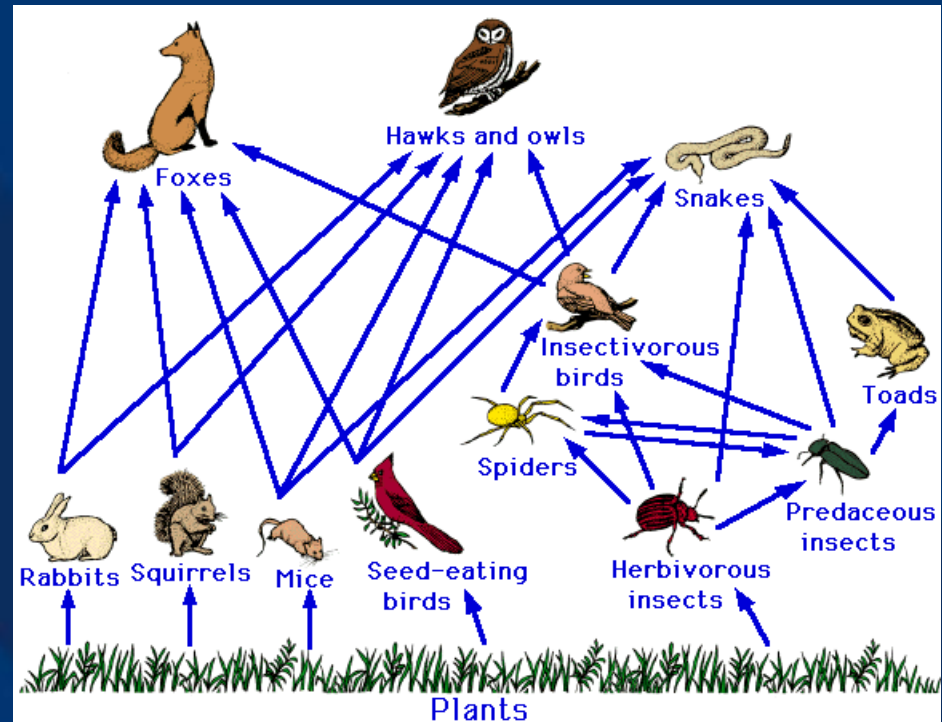
Ecology: the branch of biology dealing with the relations and interactions between organisms and their environment, including other organisms

Environment

Ecological Principles

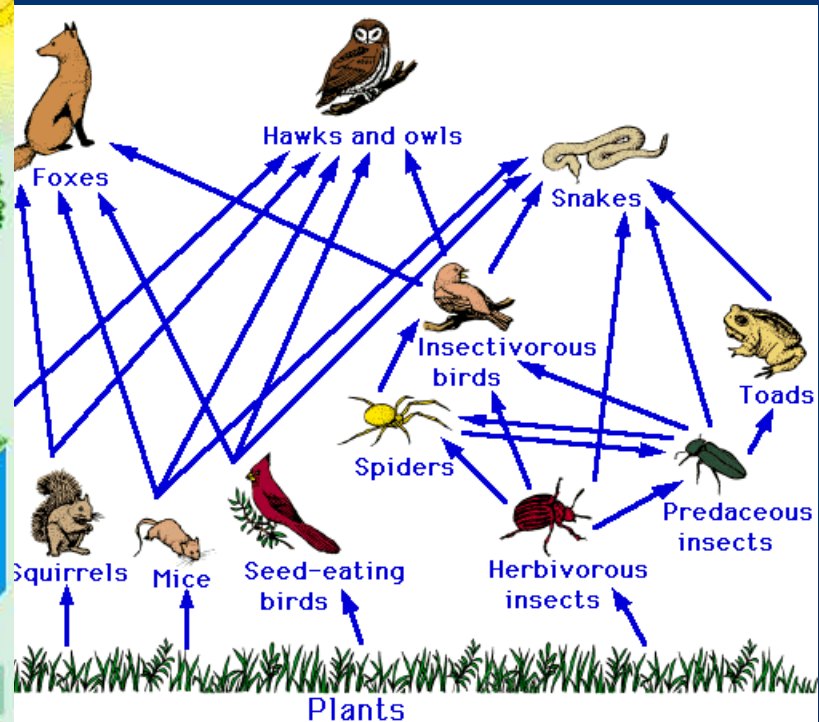
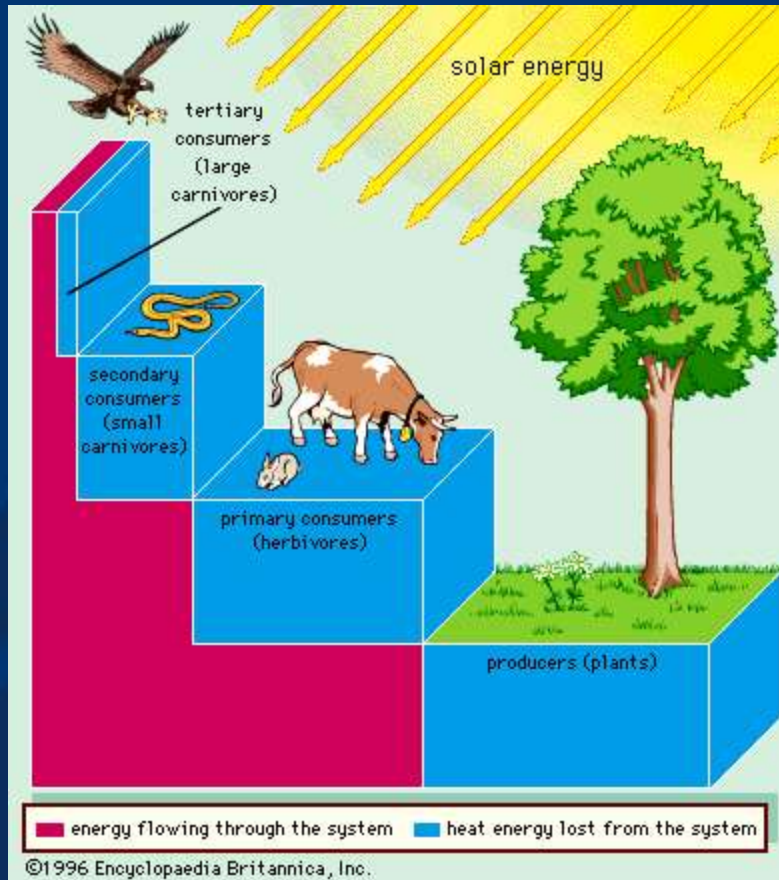
1. Matter **cycles** continually through the web of life.
2. Most of the **energy** driving the ecological cycles flows from the **sun**.
3. **Diversity** assures resilience.
4. One species' **waste** is another species' **food**.
5. The success of life on earth hinges on **networking**.

Environment



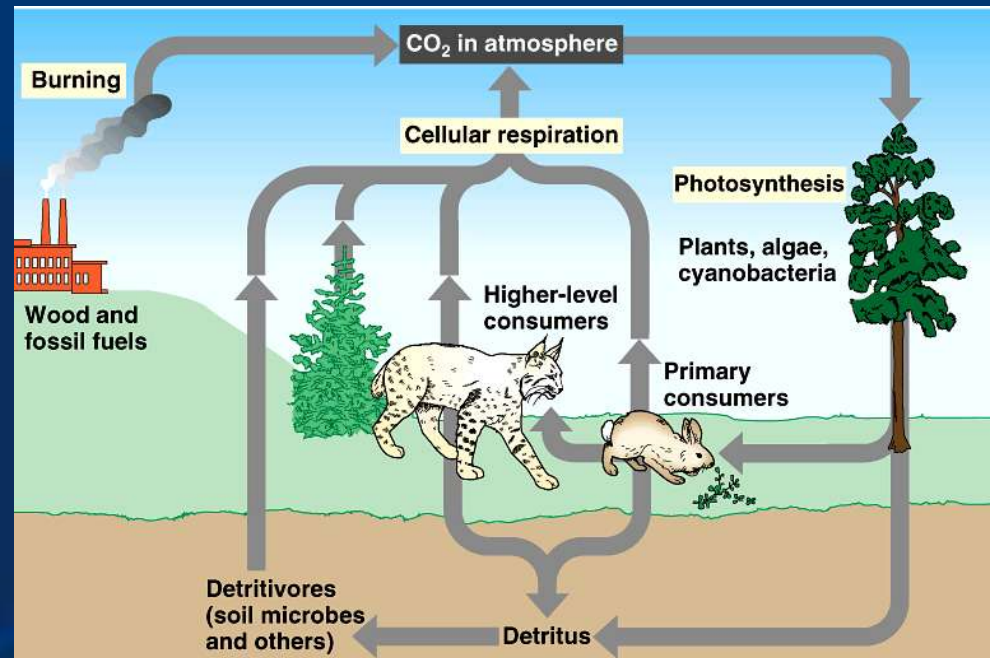
"When one tugs at a single thing in nature, he finds it attached to the rest of the world." John Muir

Environment

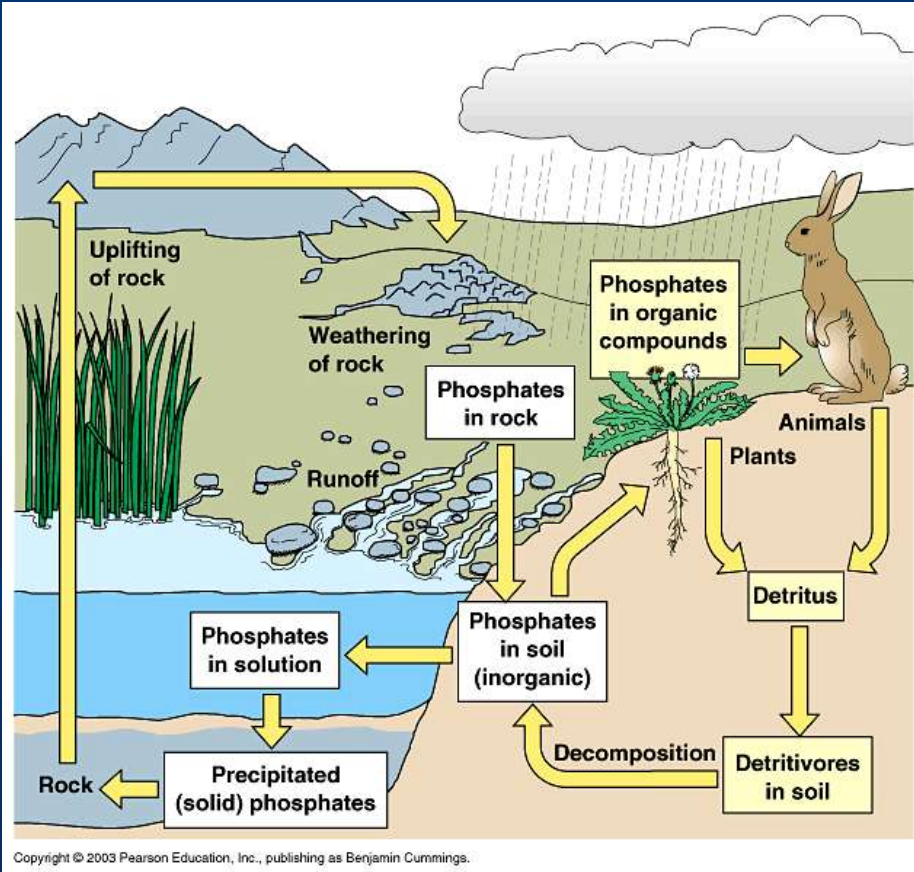


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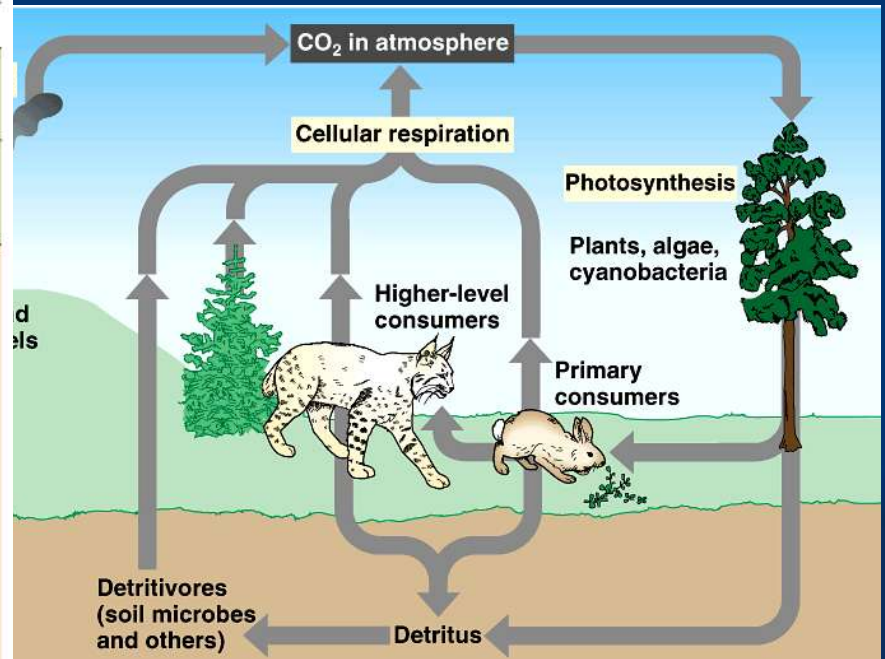
Nutrient Cycling



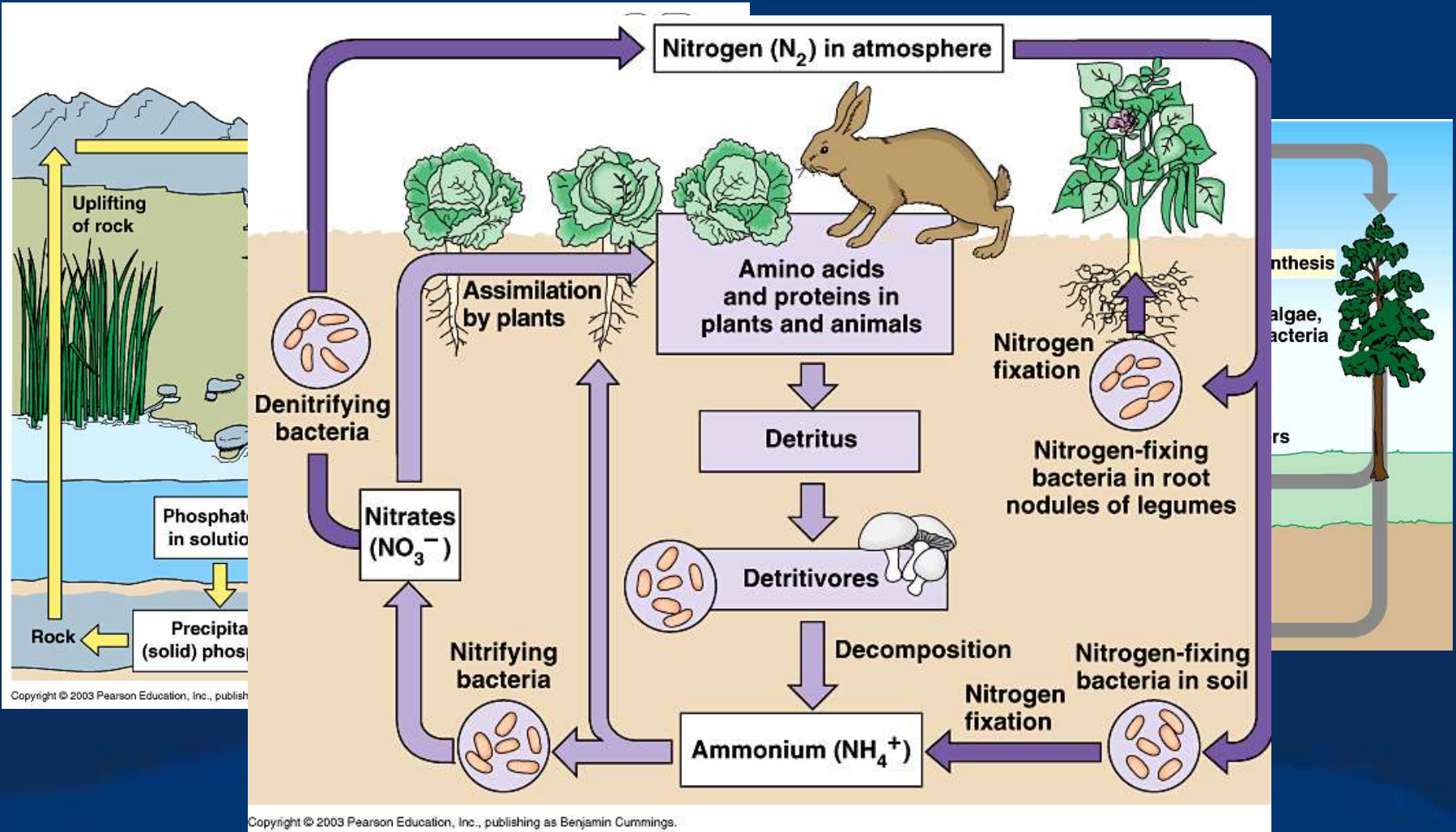
Nutrient Cycling



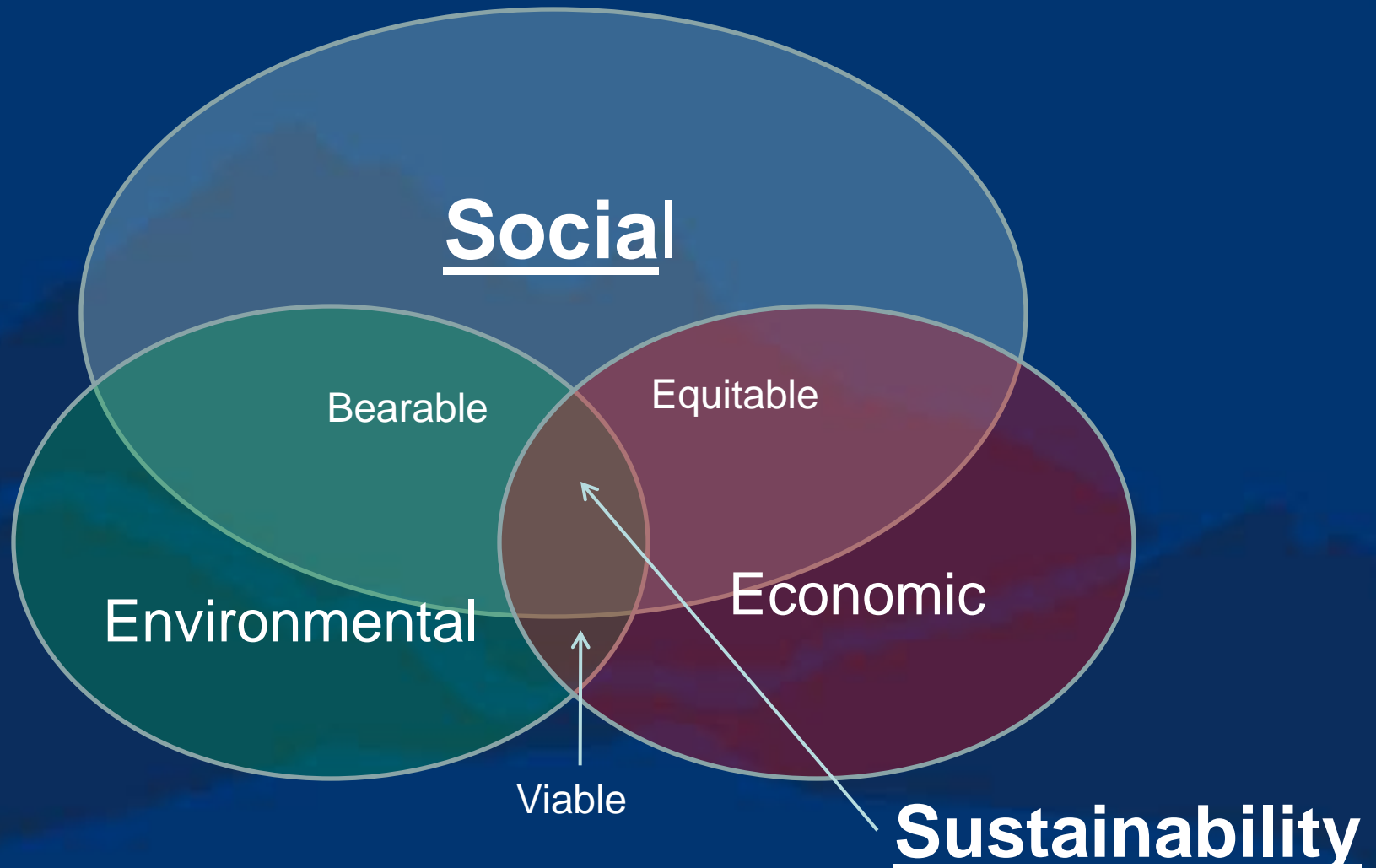
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Nutrient Cycling



Meeting the needs of the present without compromising the ability of future generations to meet their own needs.





Sustainability: What's all the hype?

Tragedy of the Commons: What is it?

*Individuals working independently and rationally in
own self interest*

Sustainability: What's all the hype?

Tragedy of the Commons: What is it?

1. Adding one animal, which can later be sold for profit
= +1
2. The cost (negative environmental costs) of adding
one animal is shared by everyone

The benefit is greater to the individual because you reap the entire benefit and the cost is shared.



Sustainability: What's all the hype?

Ecological Footprint: a measure of human demand on the earth ecosystems and resources

1.8 hectares of bio-productive land or water to support human life, average American uses 9.7 hectares



Sustainability: What's all the hype?

Social/Society

**Role of NGO's and
Government Agencies**



Sustainability: What's all the hype?

Role of NGO's

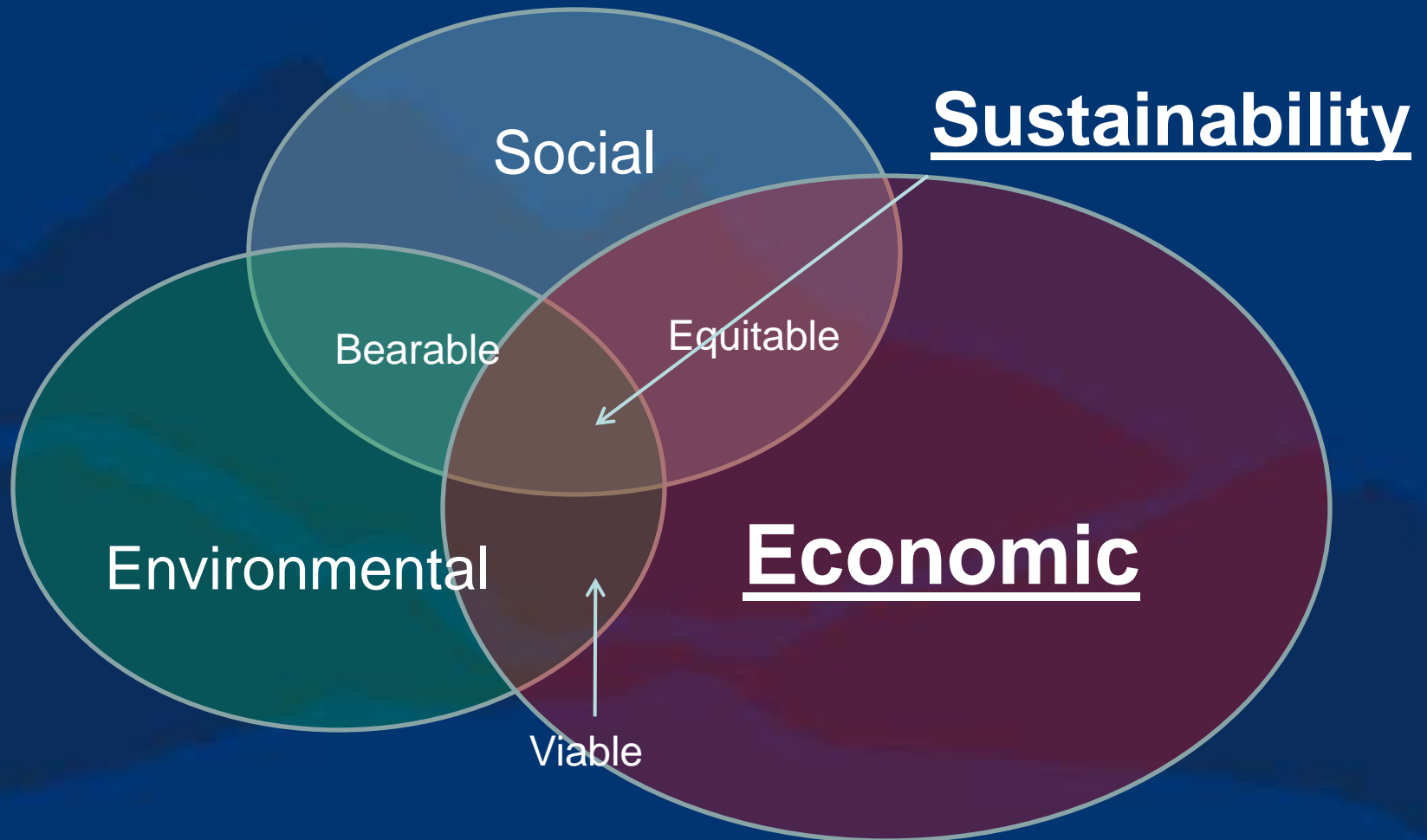
- Education (North Cascades Institute)
- Networking & Business Models
(Sustainable Connections & BALLE)
- Restoration (NSEA)
- Conservation (Farm Friends)
- Preservation (Whatcom Land Trust)

Sustainability

Government Responses to Tragedy of the Commons:

1. Tort Law
2. Subsidies
3. Emissions Charges or Permits
4. Green Taxes
5. Direct Regulation
6. Education

Meeting the needs of the present without compromising the ability of future generations to meet their own needs.





Environmental Economics

Theory of Resource Management:

1. Resources in their undeveloped state are capital assets which people can invest in by purchasing.
2. Developers of solely owned resources pay, and therefore must recover, the tangible costs of development
3. Resource development usually involves costs that are not born by extractors but are costs they should pay



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Triple Bottom Line (TBL)

- 3 P's: People, Profit, Planet
- Also, 3 E's: Equity, Economy, Ecology

TBL May Include:

From Post-Industrial

- Fossil powered
- Take, make, waste
- Living off nature's capital
- Market as master
- Loss of cultural & biological diversity
- Independence
- Materialism as goal

To Life-Sustaining

- Non-polluting powered
- Cyclical production
- Living off nature's income
- Market as servant
- Increased cultural & biological diversity
- Interdependence
- Human satisfaction goal



Triple Bottom Line (TBL)

MIT – Sloan School of Management
The Business of Sustainability (2009)

A survey of more than 1,500 corporate
executives and managers

Exhibit 3. Respondents Cited—by a Large Margin—an Improved Image as the Principal Benefit of Addressing Sustainability

What are the greatest benefits to your organization in addressing sustainability issues?

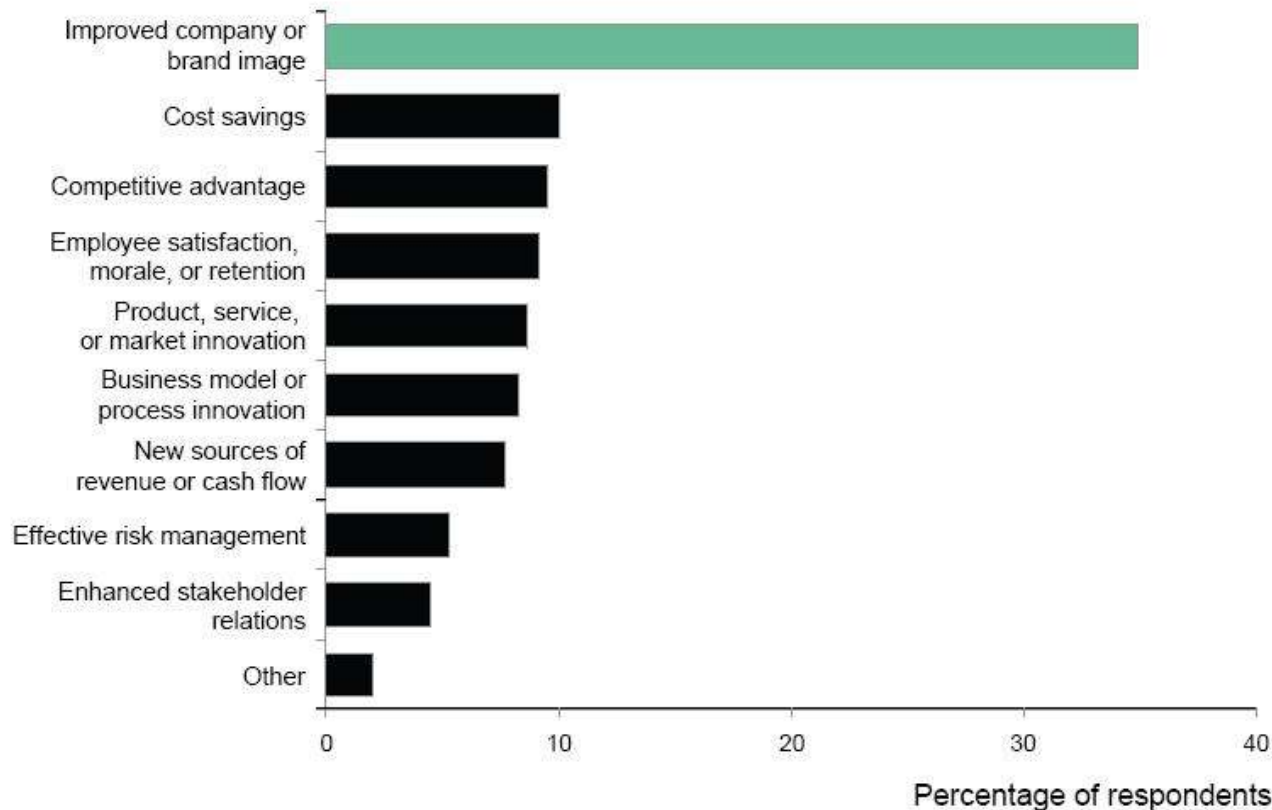
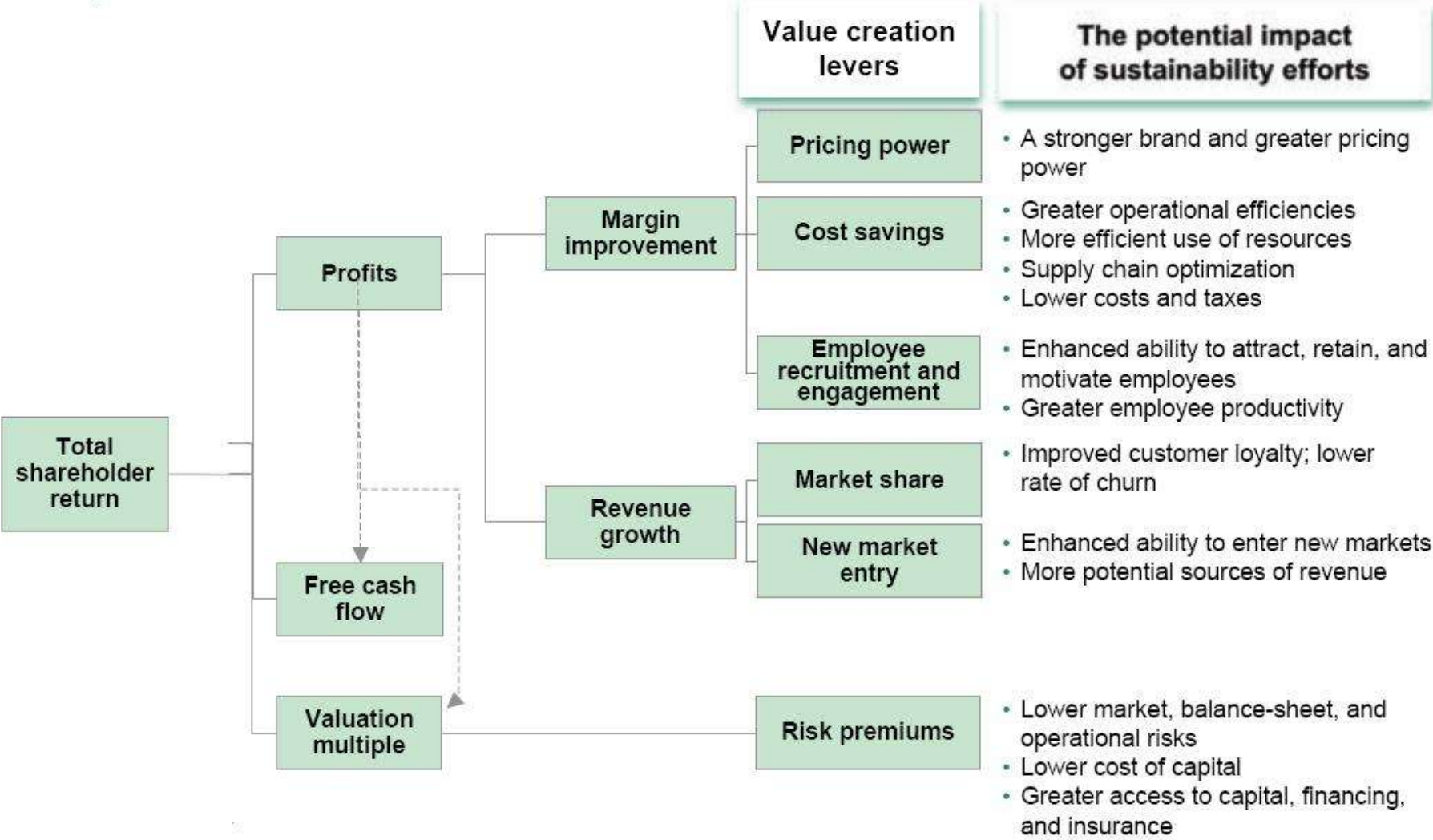


Exhibit 5. Sustainability Efforts Could Influence All the Levers That Companies Use to Create Value



Sources: The Sustainability Initiative 2009 Survey, BCG and MIT Sloan Management Review; interviews with thought leaders.

Primary themes

Equilibrium / equity

"Addressing the entire life cycle of our products and services and balancing them with our world's needs."
 "The balance of consumption with the effects it causes to the environment."
 "A set of environmental, economic and social conditions in which all of society has the capacity and opportunity to maintain and improve its quality of life indefinitely, i.e., without degrading the quantity, quality or the availability of natural resources and ecosystems."
 "Sustainability, in a systemic approach, is the effect of integrative (total) competitiveness of systems in the hierarchy of the universe space-time-resources domains."

Short and/or long term

"Addressing issues from both a short- and long-term perspective."
 "Taking into consideration climate change, social responsibility, as well as economic issues when planning for long-term success of a business."
 "Sustainability refers to attaining long-term fiscal responsibility for personal and governmental budgets."

Environment/ resources

"Not using resources at a faster pace than they can be replenished."
 "Using technology to improve energy efficiency and reduce carbon footprint."
 "Sustainability refers to creating products and energy without exploiting non-renewable resources."

Financial security/growth

"The ability to leverage and optimize corporate resources."
 "The continued growth of my business into the future."
 "Retaining the existing customer and increasing market share for long term."

Unclear/ no definition

"We don't discuss sustainability much."
 "We are searching for how sustainability should be properly defined."
 "We have no formal definition of sustainability. Informally, we try not to print out e-mails unnecessarily."

Direct quotes



CH2M Hill

Triple Bottom Line Practice

- 23,000 employees world-wide and employee wholly owned
 - “Private ownership empowers us to focus on long-term strategies and invest in our people, technologies, and infrastructure .”
- “Satisfied employees make better team members, resulting in longevity with the company and dedication to your projects.”

Triple Bottom Line Practice

CH2M HILL Brings Energy Industry Leading Experience and Capabilities to Projects

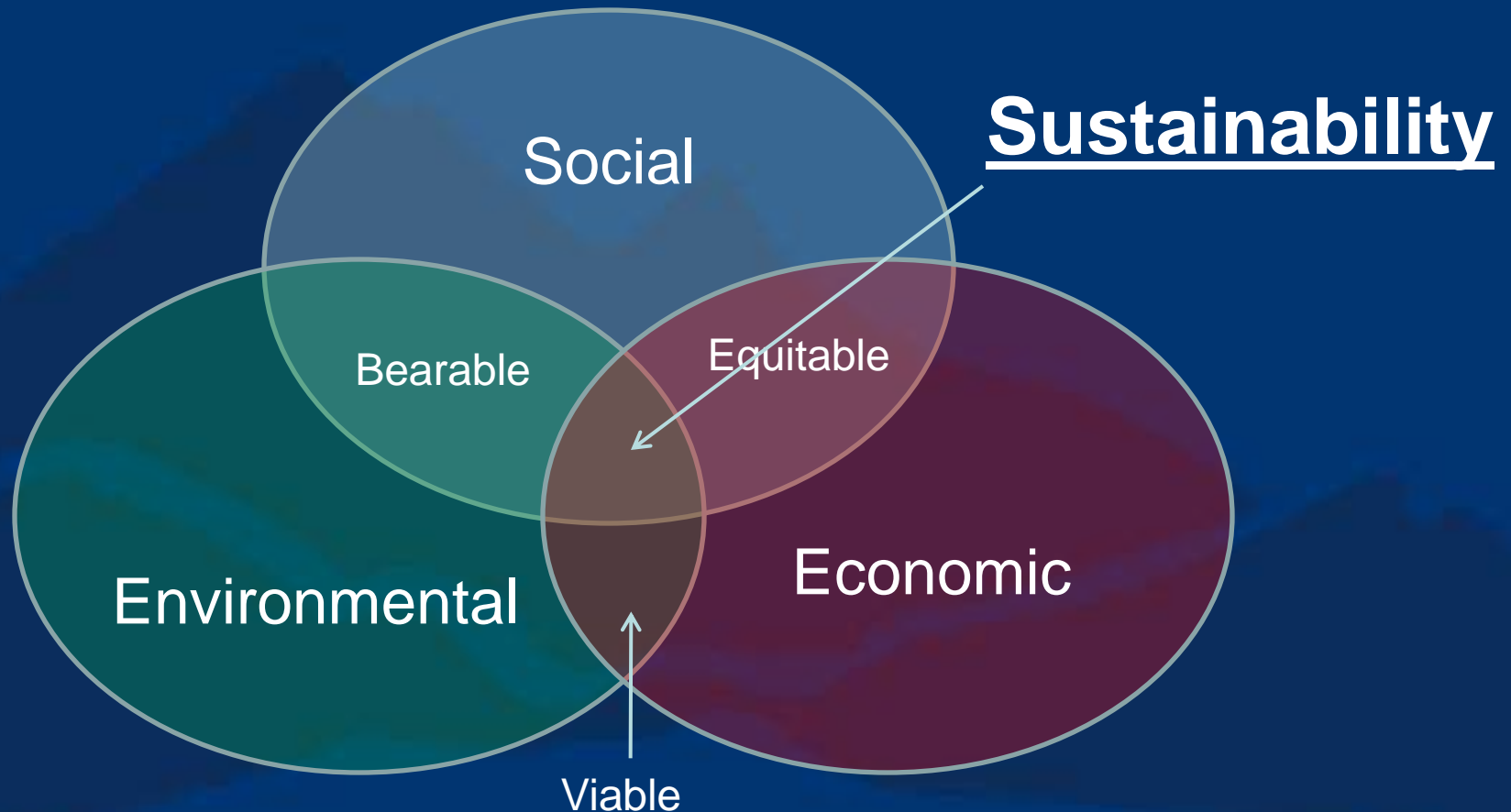
CH2M HILL is ranked among Engineering News-Record's top 10 in the following

- *The Top 500 Design Firms Sourcebook* (July 2010)
 - #5 – Design Firms
 - #1 – Pipelines
 - #1 – Cogeneration
 - #4 – Chemical Plants
 - #5 – Fossil Fuel
 - #7 – Power
 - #9 – Petroleum
 - #9 – Refineries and Petrochemical Plants
- *The Top 400 Contractors Sourcebook* (September 2009)
 - #8 – Pipelines
 - #10 – Maintenance (Petroleum)
- *Top 100 Design-Builders/Construction Managers/Program Managers* (June 2010)
 - #1 – Program Management Firms
 - #2 – Construction Management-for-Fee Firms
 - #10 – Design-Build Firms
- *The Top 200 Environmental Firms* (August 2010)
 - #1 – Environmental Firms
 - #1 – Wastewater Treatment
 - #2 – Water Supply/Treatment
 - #4 – Environmental Science



ENR Ranks
CH2M HILL #1
in Program Management for
7 consecutive years

Meeting the needs of the present without compromising the ability of future generations to meet their own needs.





Global Issues of Sustainability

1. Consumption
2. Climate Change
3. Population Growth

Consumption

Some Stats (From Worldwatch Institute):

The World's Poor:

- As many as 2.8 billion people survive on less than \$2 per day
- Nearly 2 billion don't have access to safe drinking water
- Nearly 1 million are undernourished, while the US is suffering from "over-nourishment" (obesity)

Consumption

Some Stats (From Worldwatch Institute):

The US Consumer:

- In 2003, more private cars than licensed drivers
- New houses in the US were 38% bigger in 2002 than in 1975, despite having fewer people per household
- Only 5% of world population, yet consume 25% of coal, 26% of oil, 27% of natural gas

Consumption

Some Stats (From Worldwatch Institute):

Environment/Ecological Footprint:

- 1.8 hectares of bio-productive land or water to support human life, average American uses 9.7 hectares (5% of world population uses over 30% of the resources)
- Some in very poor countries use less than $\frac{1}{2}$ hectare
- On average, human population using 2.2 hectares



Fig. 16: HUMANITY'S ECOLOGICAL FOOTPRINT,
1981-2001

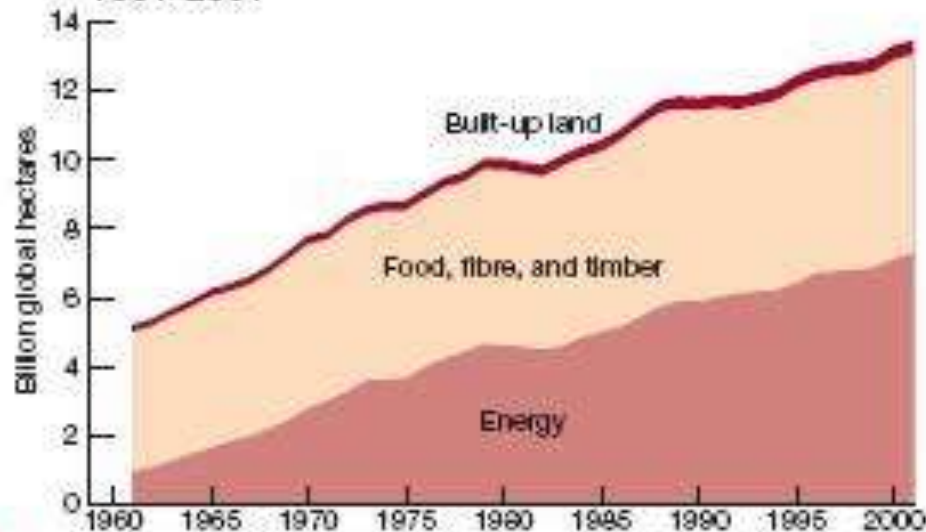


Fig. 22: HUMANITY'S ENERGY FOOTPRINT,
1981-2001

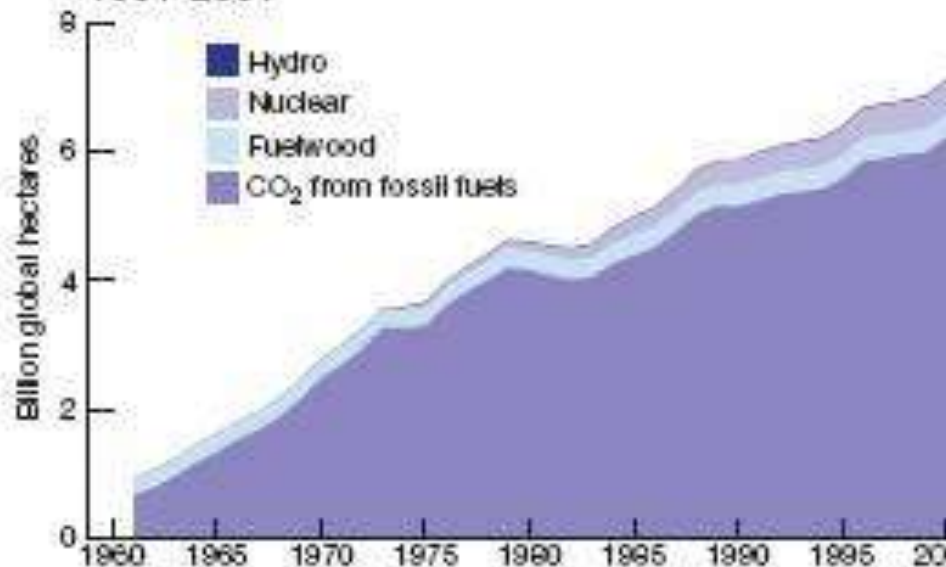


Fig. 23: ENERGY FOOTPRINT BY REGION,
2001

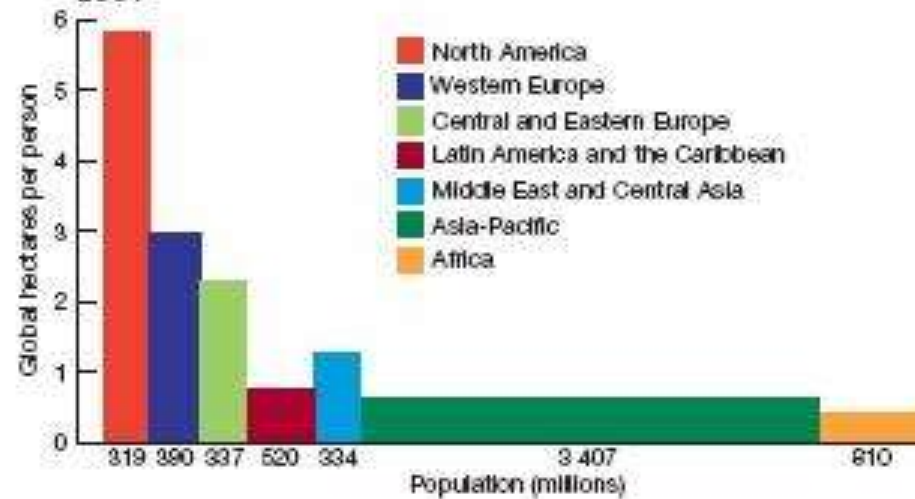
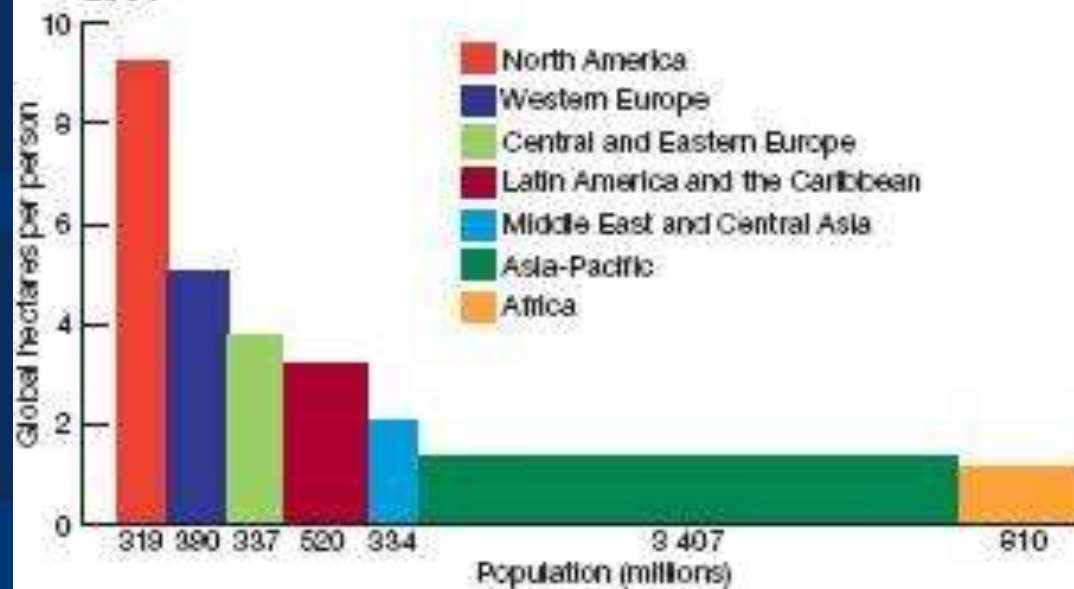


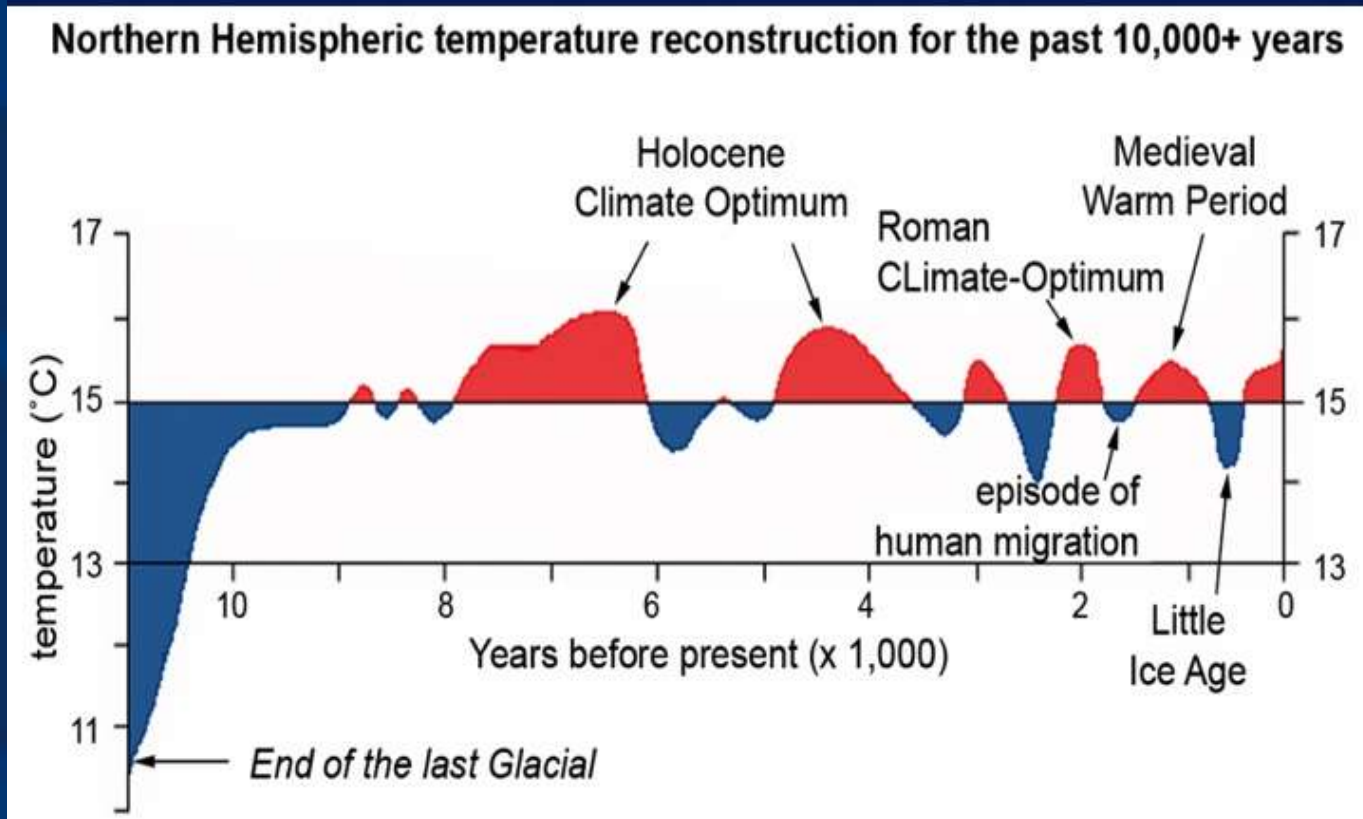
Fig. 17: ECOLOGICAL FOOTPRINT BY REGION,
2001



Global Climate Change

Historical Global Climate

Climate swings of past 12,000 years



Global Climate Change

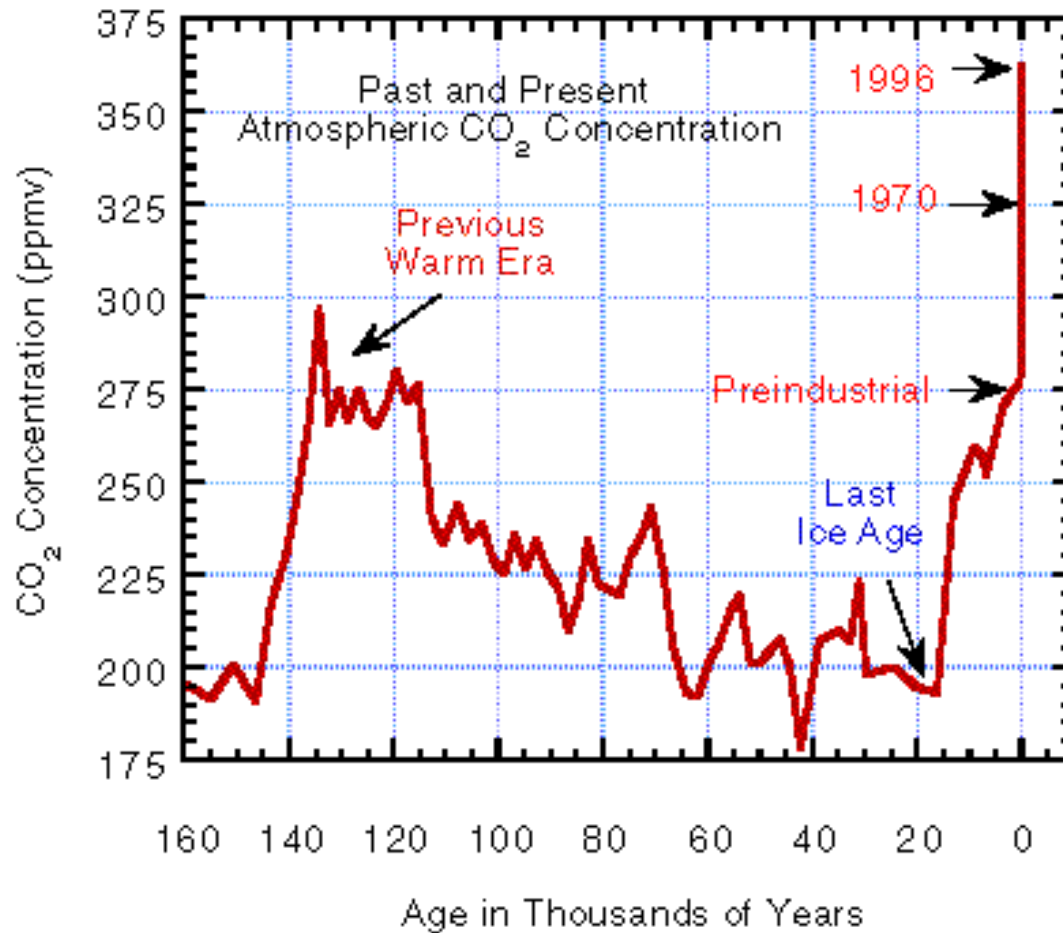
Why does this picture look like this?

Concentration of Carbon Dioxide in the Atmosphere



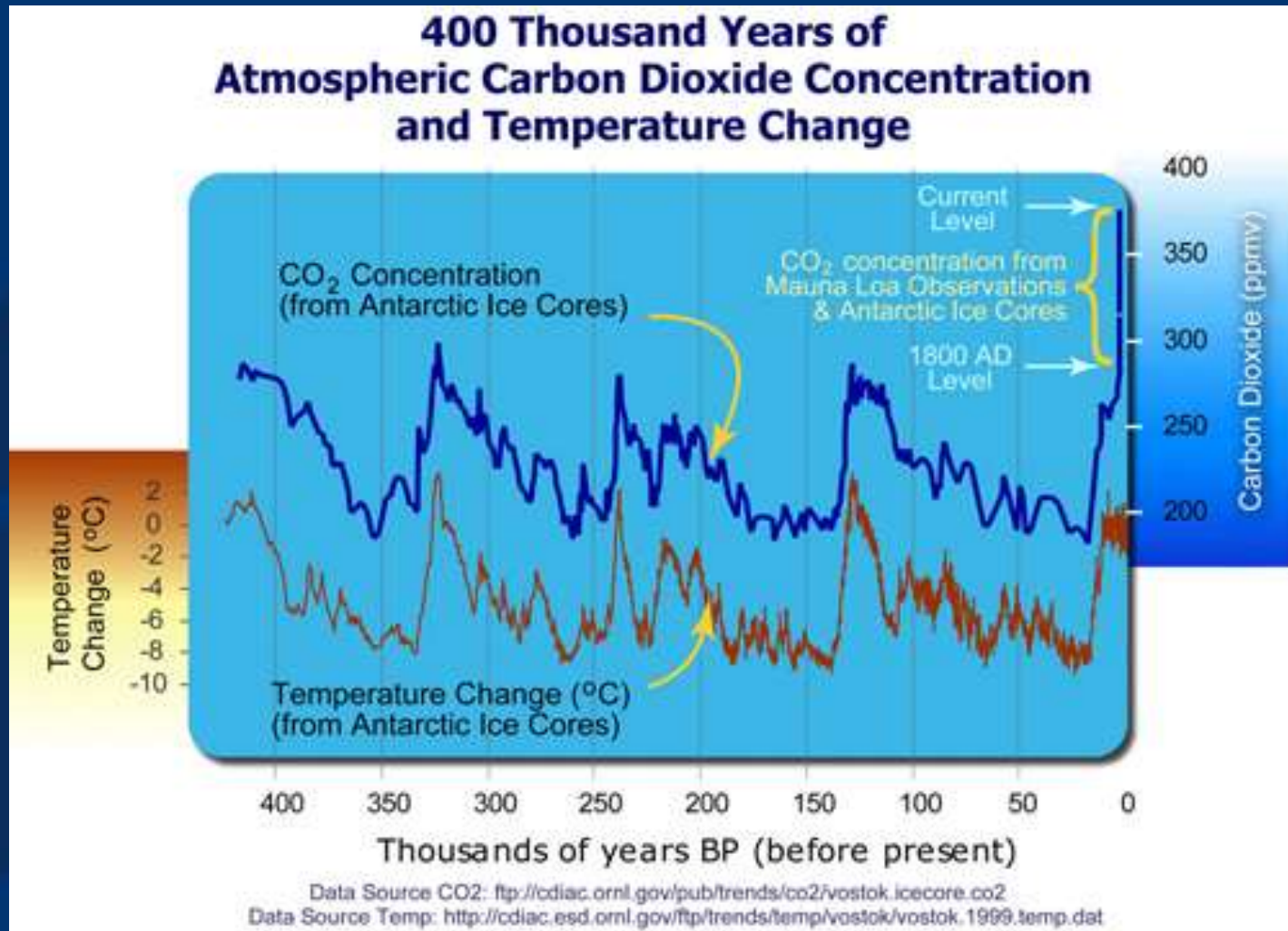
Global Climate Change

Historical Global Climate & CO₂



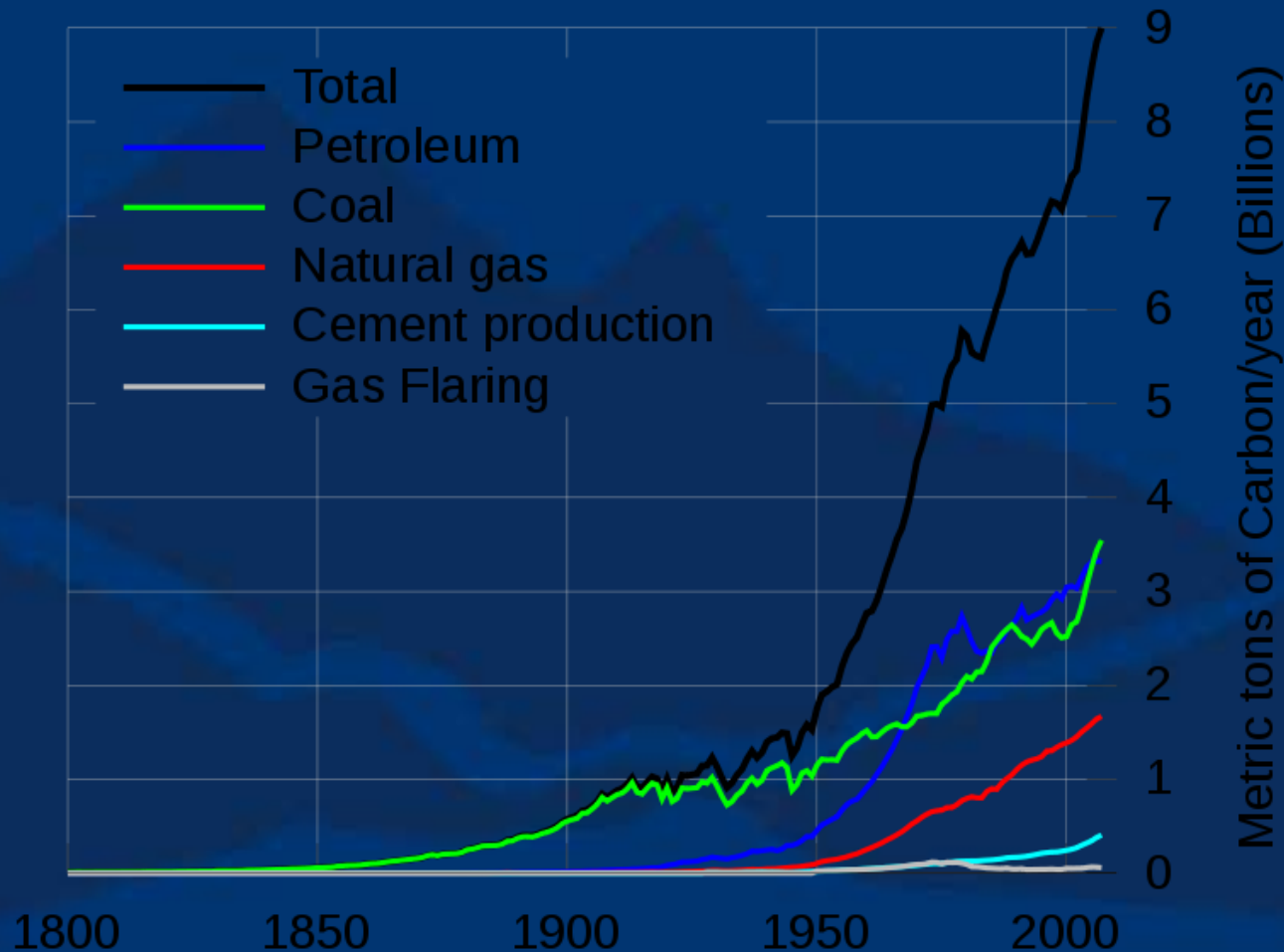
Global Climate Change

Historical Global Climate & CO2



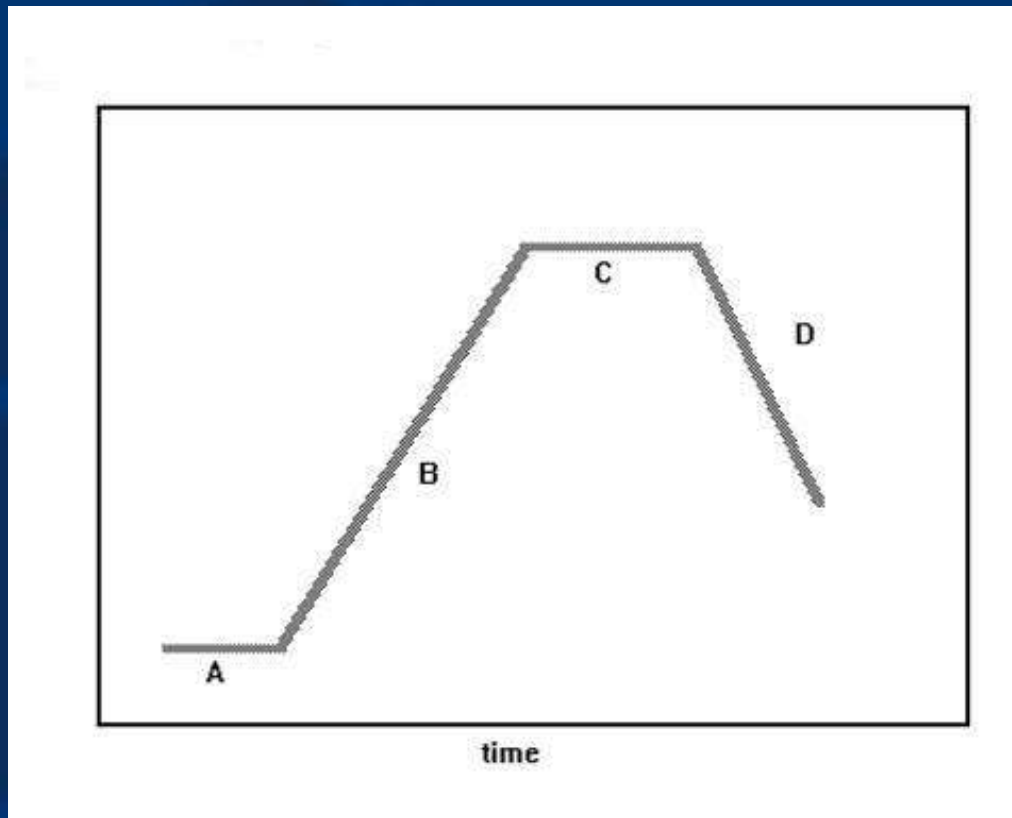
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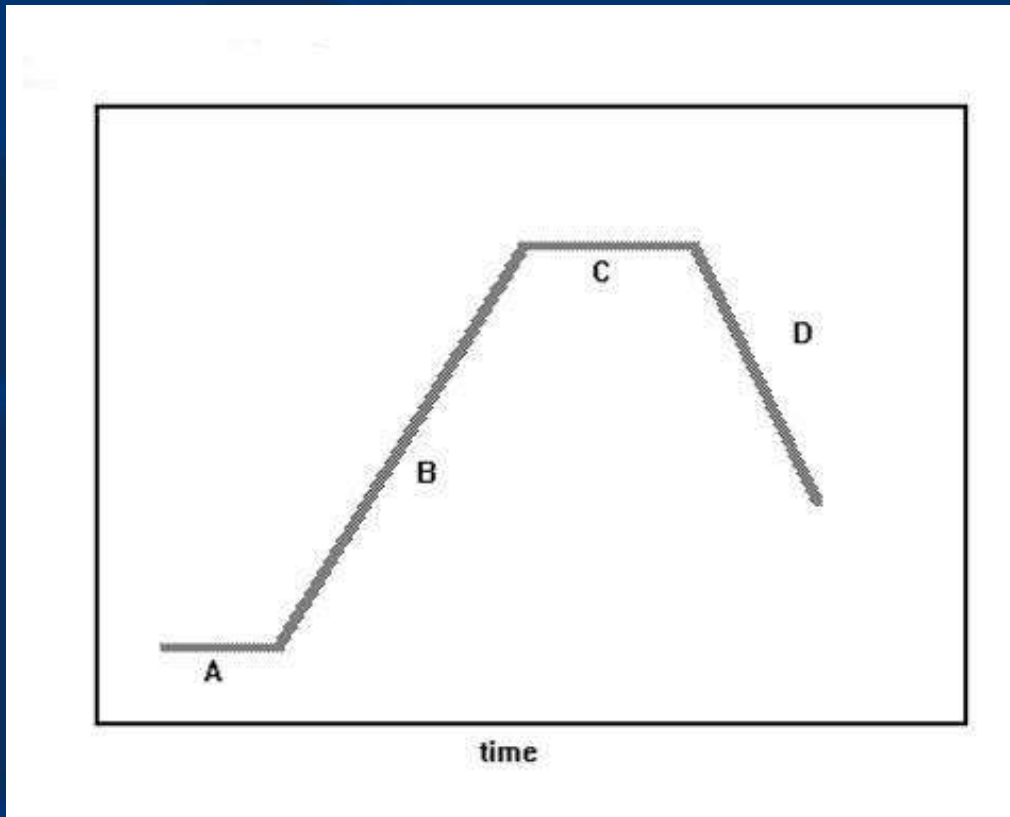
Population Growth

What Population is this?



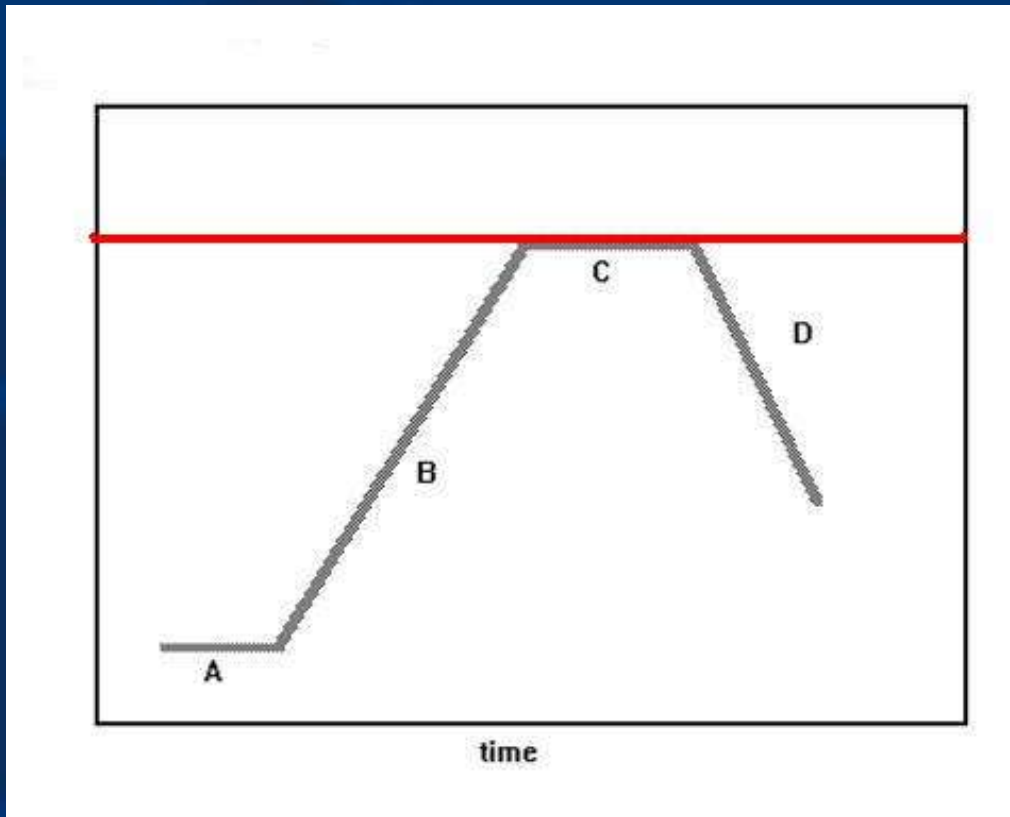
Population Growth

Growth/Culturing of Bacteria



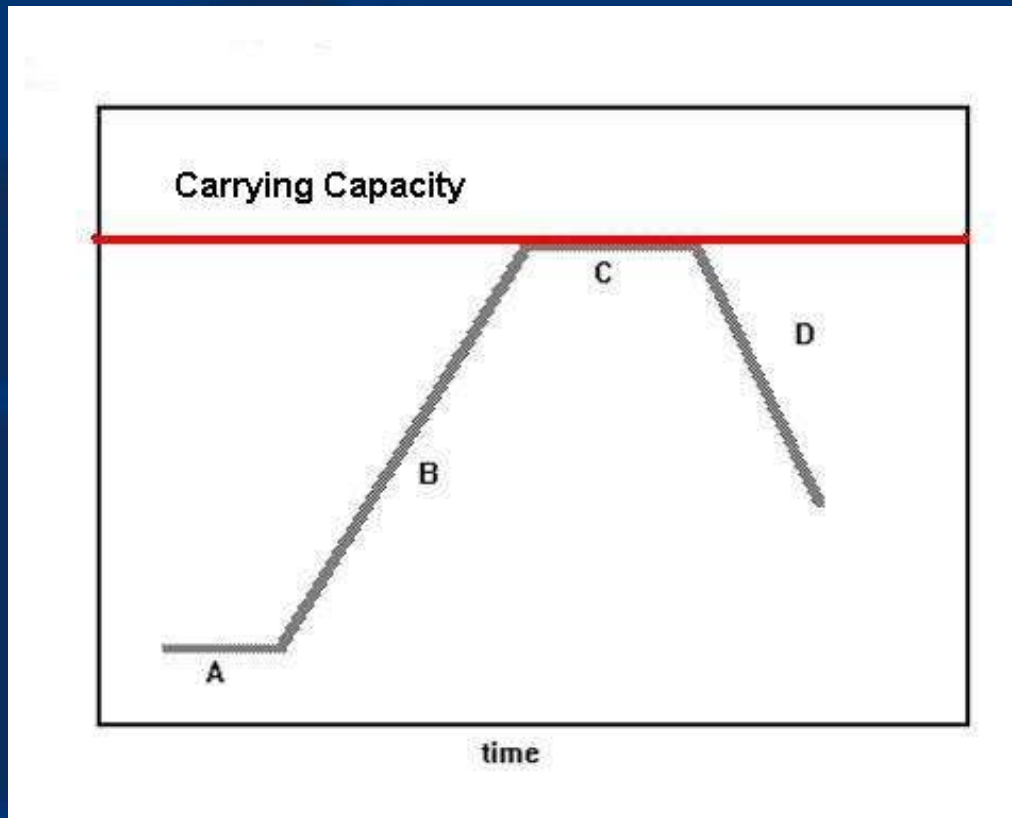
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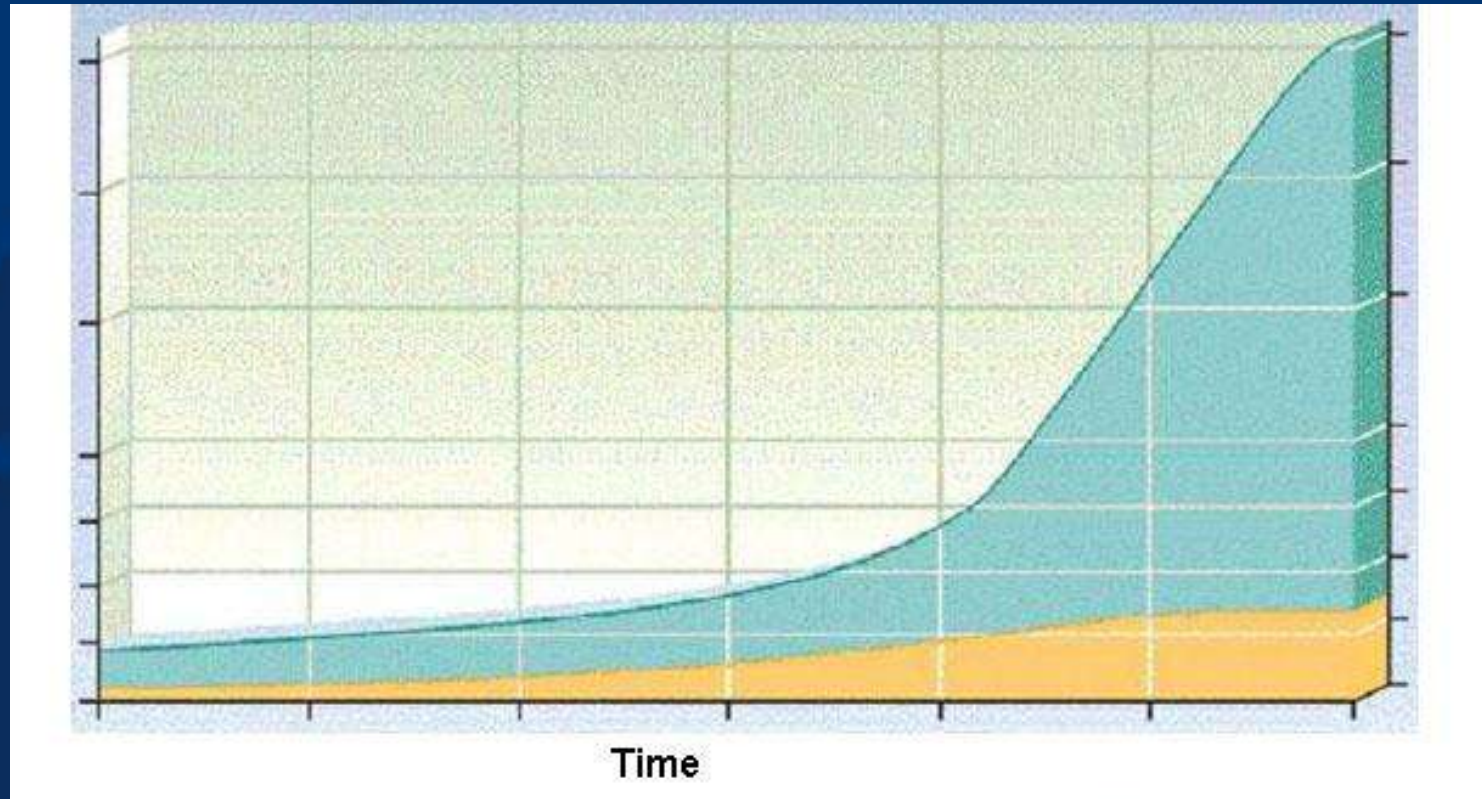
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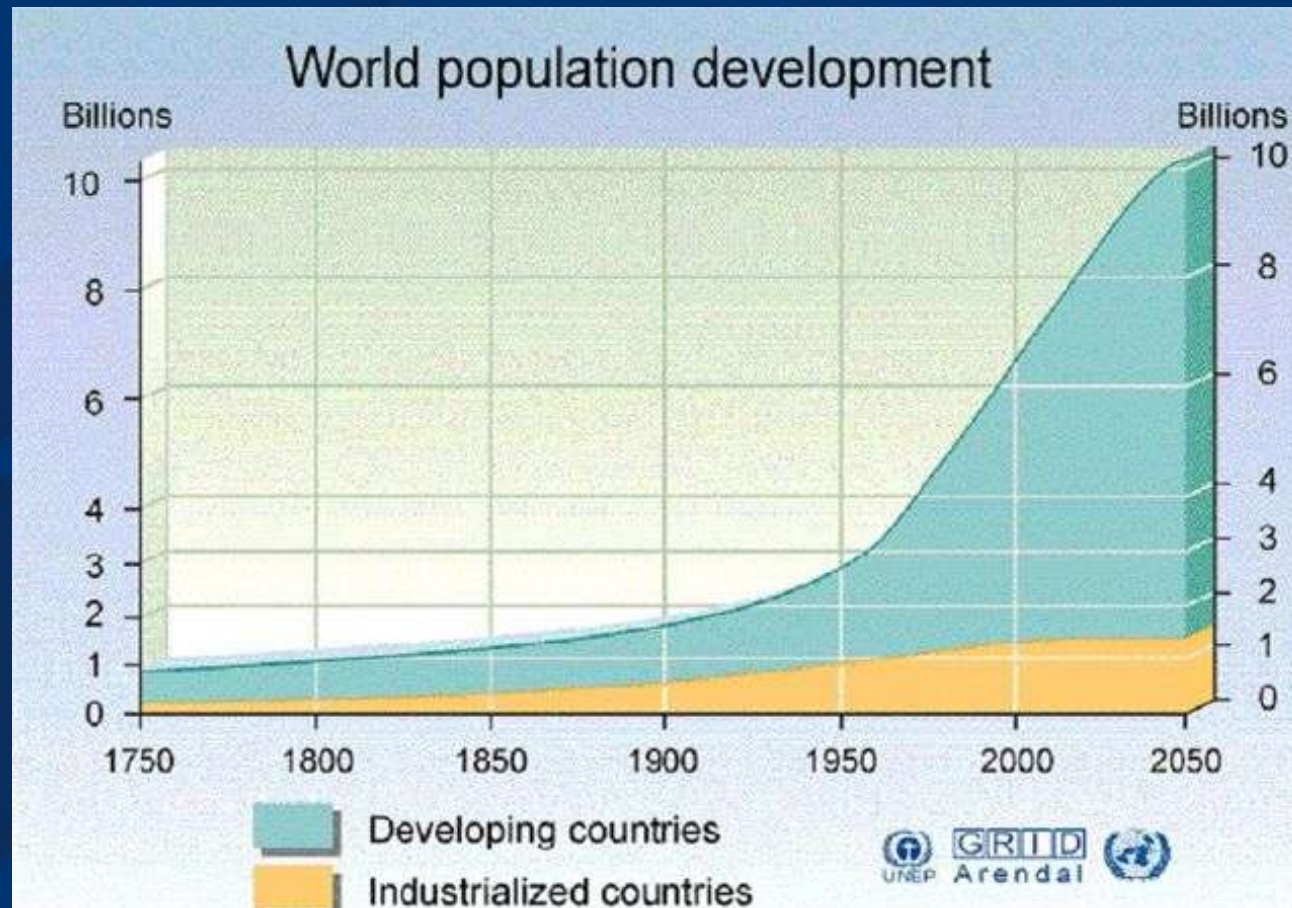
Population Growth

- What population is this?



Population Growth

- World Population





Community Sustainability

“...the concept of sustainability promises to remake the world through reflection and choice, but it’s potential to engage people’s hopes, imagination, and sense of responsibility may depend more on strategic uses of ambiguity than on conceptual precision and clarity.”

“It is not meaningful to measure the absolute sustainability of a society at any point in time.”

Lamont Hempel, *Toward Sustainable Communities*



Questions to Consider

1. Is there a place for ambiguity in the sustainability dialogue? What are the benefits and/or limitations?
2. What do you see as barriers to becoming a more sustainable community, nation, world?
3. Do we need regulation to promote sustainability? Why or why not?
4. What major shifts have you seen to promote environmental, social and/or economic sustainability?
5. What can individuals do to foster a more sustainable world?
6. Has the piece from “Natural Capitalism” added to your perspective on sustainability? If so, how?



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Thank You